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Composition of the essential oil of *Jurinea leptoloba* growing wild in Iran

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ABSTRACT

Water-distilled essential oil from the aerial parts of *Jurinea leptoloba* was analyzed by GC and GC-MS. Thirteen components of the oil of *Jurinea leptoloba* characterized, representing 70.55 % of the total components detected. Non-terpenoid hydrocarbons and normal alkanes were the major components in this oil. The major constituents were identified as 6-n-butyl-2,3,4,5-tetrahydropyridine (15.6 %) and Cyclohexene,3,5,5-trimethyl (11.26 %). 1,3-(D_2)-Menth-2-ene was identified as terpenoid component in this oil.

KEYWORDS: *Jurinea leptoloba*, essential oil, *Compositae*, 1,3-(D_2)-Menth-2-ene

INTRODUCTION

From the large Eurasian genus Jurinea (*Compositae*, tribe *Cynareae*, subtribe *Carduinae*) with about 250 species so far only 14 have been studied chemically. Most widespread are sesquiterpene lactones similar to those from the genus *centaurea*[1,2]. However, derivatives of the latter genus but are widespread in Jurinea[3]. The aerial parts of *Jurinea leptoloba* afforded Shirazolide and 14-α-dihydroshirazolide two elemanolides [2], germacranolides albicolide, salonitenolide, pectorolide, jurinelloide and its 20-hydroxy derivative, four new melampolides, two elemanolides, 1-beta-hydroxy-beta-costol glucopyranoside and dihydrosyringenin[1]. In this work, we report on the analysis of the essential oils of aerial parts of *J. leptoloba* grown wild in Iran. To the best of our knowledge no data are available about the composition of the essential oil of *Jurinea leptoloba* in the literature. The authors believe that further studies of essential oil composition of other populations (other Iran's provinces) are necessary to have an interesting insight into the different chemotypes of the species.

MATERIAL AND METHODS

General

The major equipment types used were a Clevenger apparatus, GC (Schimadzu 15A), GC/MS (Hewlett-Packard 5973 with a HP-5MS column), microbial culture media (Merck), Shimadzu UV-2501PC spectrophotometer. Chemicals were of analytical grade.

Plant material

The aerial part of *Jurinea leptoloba* collected in july 2011 from south of Shiraz, Iran, voucher number 324R,deposited in the Herbarium of the Department of Botany, Shahid Beheshti University, Tehran, Iran.

Isolation of the essential oil

The leaves of *J. leptoloba* were dried at room temperature for several days. Air-dried leaves of *J. leptoloba* (150 g) was separately subjected to hydrodistillation using a clevenger-type apparatus for 4h. After decanting and drying of the oil over anhydrous sodium sulfate, the oil was recovered. Results showed that essential oil yield was 0.4% (w/w).

Analysis of the the essential oil

The composition of the essential oil obtained by hydrodistillation from the leaves of *J. leptoloba* was analyzed by GC and GC/MS. Identification of the constituents of oil was achieved by comparison of their mass spectra and retention indices with those reported in the literature and those of authentic samples[4].

Gas chromatography

GC analysis was performed on a Schimadzu 15A gas chromatography equipped with a split/splitless injector (250ºC) and a flame ionization detector (250ºC). Nitrogen was used as carrier gas (1 ml/min) and the capillary column used was DB-5 (50m x 0.2 mm, film thickness 0.32 µm). The column temperature was kept at 60ºC for 3 min and then heated to 220ºC with a 5ºC/min rate and kept constant at 220ºC for 5 min. Relative percentage amounts were calculated from peak area using a Schimadzu C-R4A chromatopac without the use of correction factors.

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Gas chromatography-Mass Spectroscopy

GC-MS analysis was performed using a Hewlett-Packard 5973 with a HP-5MS column (30 m x 0.25 mm, film thickness 0.25 µm). The column temperature was kept at 60ºC for 3 min and programmed to 220ºC at a rate of 5ºC/min and kept constant at 220ºC/min for 5 min. The flow rate of Helium as carrier gas (1 ml/min). MS were taken at 70 eV. The retention indices for all the components were determined according to the Van Den Dool method, using n-alkanes as standards. The compounds were identified by (RRI, DB5) with those reported in the literature and by comparison of their mass spectra with the Wiley library or with the published mass spectra [4,5].

RESULTS AND DISCUSSION

The composition of the essential oils of *Jurinea leptoloba* is listed in Table **1**, respectively, in which the percentage and relative indices of components are given. As shown in Table **1**, 13 components in the oil of *J. leptoloba*, which represented about 70.55 % of the total oil, were identified. Non-terpenoid components and hydrocarbons were the major component in this oil. The major constituents were identified as 6-n-butyl-2,3,4,5-tetrahydropyridine (15.6 %) and Cyclohexene,3,5,5-trimethyl (11.26 %). 1,3-(D_2)-Menth-2-ene was identified as monoterpenoid component in this oil. GC-MS chromatogram of *Jurinea leptoloba* essential oil is given in Figure **1**.

Table 1. Composition of the essential oil of *Jurinea leptoloba*

Compound	KI	Percentage(%)
Octamethylcyclotetrasiloxane	991	10.08
Spiro[3,4]octan-1-one,5-methyl-cis	997	5.09
Pentadecane,2,6,10,14-tetramethyl	1101	3.81
Cyclohexene,3,5,5-trimethyl	1192	11.26
n-Dodecane	1199	7.22
n-Tetradecane	1399	4.87
1,2-epoxy- Hexadecane	1414	1.24
n-Pentadecane	1500	1.08
1,3-(D_2)-Menth-2-ene	1508	1.09
Phenol, 2,4-bis(1,1-dimethylethyl)	1522	1.98
Phenol, 2,4-bis(1,1-dimethylethyl)-4-methyl	1530	4.62
2-Chloro-6-hydroxyisonicotinic acid	1670	2.61
6-n-butyl-2,3,4,5-tetrahydropyridine	1729	15.60
***Total of percentage* = 70.55%**		

*RI, Retention indices were as determined on a DB-5 column using the homologous series of n-alkanes

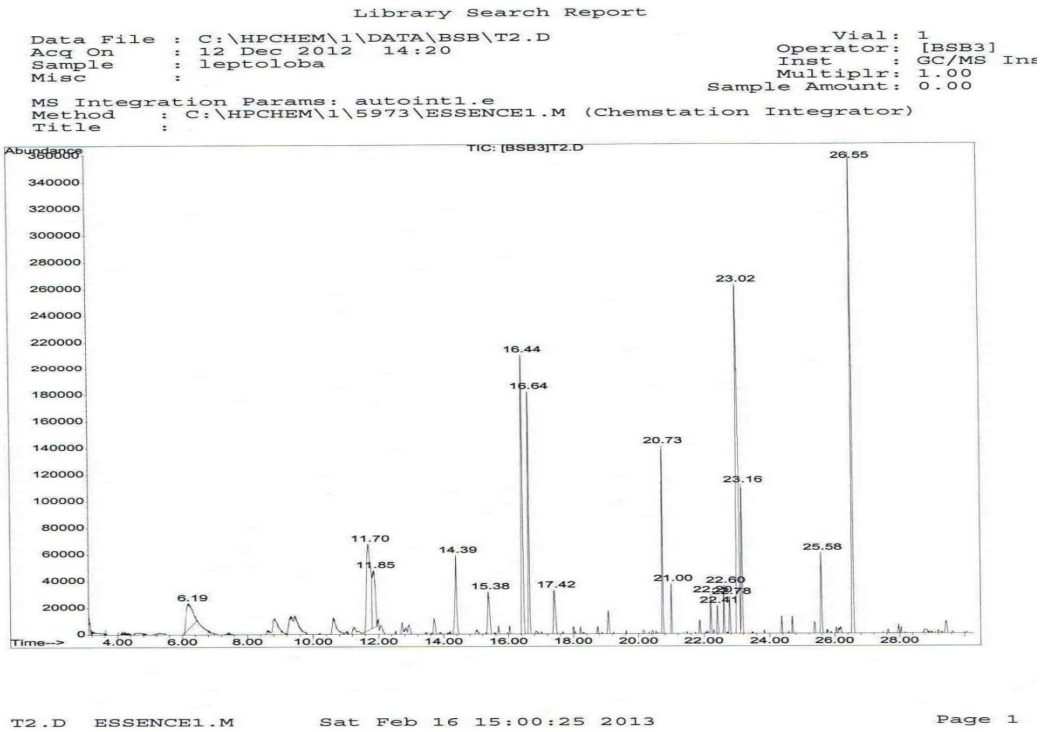

Fig. 1. GC-MS chromatogram of *Jurinea leptoloba* essential oil

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